Remarks

The Office Action mailed December 6, 2006, and made final, has been carefully reviewed and the following remarks have been made in consequence thereof.

Claims 8-22 are pending in this application. Claims 8-10, 15-18 and 21 stand rejected. Claims 11-14, 19 and 20 have been withdrawn. Claim 22 is newly added. No additional fee is due for newly added Claim 22. No new matter has been added.

The rejection of Claims 8-10 and 15-18 under 35 U.S.C. § 102(b) as being anticipated by Dyste et al. (U.S. Patent 3,222,864) (hereinafter referred to as "Dyste") is respectfully traversed.

Dyste describes a gas turbine engine-recuperator combination (10) including a gas turbine engine (12) and a recuperator (14) having an annular heat exchanger (56). The annular heat exchanger includes an aggregate of pipes (60), wherein each pipe extends parallel to an axis of rotation of engine (12). As such, during operation, exhaust from engine (10) is discharged substantially parallel to each pipe. Accordingly, Dyste does not describe nor suggest a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine. Rather, Dyste describes a heat exchanger, wherein each heat exchanger element is aligned substantially *parallel* to a direction of exhaust flow discharged substantially axially from a gas turbine engine.

Claim 8 recites a heat exchanger assembly for a gas turbine engine, wherein the heat exchanger assembly comprises "an annular manifold comprising an inlet manifold coupled in flow communication with a compressor and an outlet manifold coupled in flow communication with a combustor, said annular manifold substantially concentrically aligned with respect to an axis of rotation of the gas turbine engine, and said inlet manifold and said outlet manifold each including an outermost surface having a substantially equal radial distance with respect to the axis of rotation of the gas turbine engine . . . an annular heat exchanger coupled in flow communication to ~~a~~ the compressor via said annular manifold, said heat exchanger configured to channel compressor discharge air to said combustor, said heat exchanger assembly coupled to said gas turbine engine such that said heat exchanger is substantially concentrically aligned with respect to the axis of rotation of the gas turbine

engine, said heat exchanger comprising a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from the gas turbine engine."

Dyste does not describe nor suggest a heat exchanger assembly for a gas turbine engine as is recited in Claim 8. Specifically, Dyste does not describe or suggest a heat exchanger assembly including a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine. Rather, in contrast with the present invention, Dyste describes a heat exchanger, wherein each heat exchanger element is aligned substantially *parallel* to a direction of exhaust flow discharged substantially axially from a gas turbine engine. Accordingly, for at least the reasons set forth above, Claim 8 is submitted to be patentable over Dyste.

Claims 9-10, 15, and 16 depend from Claim 8. When the recitations of Claims 9-10, 15, and 16 are considered in combination with the recitations of Claim 8, Applicants submit that dependent Claims 9-10, 15, and 16 likewise are patentable over Dyste.

Claim 17 recites a gas turbine engine comprising "a compressor . . . a combustor downstream from said compressor . . . a turbine coupled in flow communication with said combustor . . . a heat exchanger assembly comprising . . . an annular manifold comprising an inlet manifold coupled in flow communication with said compressor and an outlet manifold coupled in flow communication with said combustor, said annular manifold concentrically aligned with respect to an axis of rotation of the gas turbine engine, and said inlet manifold and said outlet manifold each including an outermost surface having a substantially equal radial distance with respect to the axis of rotation of the gas turbine engine . . . an annular heat exchanger comprising a plurality of heat exchanger elements, said heat exchanger coupled in flow communication to said compressor via said annular manifold, said heat exchanger configured to channel compressor discharge air to said combustor, said heat exchanger assembly coupled to said gas turbine engine such that said annular heat exchanger is substantially concentrically aligned with respect to the axis of rotation of the gas turbine engine, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from the gas turbine engine."

Dyste does not describe nor suggest a gas turbine engine having a heat exchanger assembly as is recited in Claim 17. Specifically, Dyste does not describe or suggest a heat exchanger assembly including a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine. Rather, in contrast with the present invention, Dyste describes a heat exchanger, wherein each heat exchanger element is aligned substantially *parallel* to a direction of exhaust flow discharged substantially axially from a gas turbine engine. Accordingly, for at least the reasons set forth above, Claim 17 is submitted to be patentable over Dyste.

Claim 18 depends from Claim 17. When the recitations of Claim 18 are considered in combination with the recitations of Claim 17, Applicants submit that dependent Claim 18 likewise is patentable over Dyste.

For at least the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 8-10 and 15-18 be withdrawn.

The rejection of Claims 8-10 and 15-18 under 35 U.S.C. § 103(a) as being unpatentable over Zirin (U.S. Patent 3,201,938) in view of Beam, Jr. et al. (U.S. Patent 3,386,243) (hereinafter referred to as "Beam") or Dyste is respectfully traversed.

Dyste is described hereinabove.

Zirin describes a gas turbine powerplant (10) including an axial flow compressor (11), a combustor (12), a gas turbine engine (13), a power turbine (14) and heat exchanger members (22). Each of the heat exchanger members (22) is connected to a plurality of conduits (27) including an outer annular header (23), an inner annular header (24) and conduits (25). Notably, during operation, exhaust from engine (13) is discharged radially outward therefrom. Accordingly, Zirin does not describe nor suggest a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine. Rather, Zirin describes a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged *radially outward* from a gas turbine engine.

Beam describes a turboprop engine including a compressor (5), a diffuser (6), a combustion apparatus (7), a turbine (9) and an annular recuperator (10). During operation, air flows from the diffuser (6) to the recuperator (10) through air inlets pipes (13) that are spaced around an axis of the engine. Heated air flows back to the combustion apparatus (7) through pipes (14) distributed around the engine axis. The air inlet pipes (13) and the pipes (14) are connected to a recuperator structure (18) that defines return flow paths for compressed air entering through the air inlet pipes (13) and channeled through the pipes (14). Notably, Beam does not describe nor suggest a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine.

Claim 8 recites a heat exchanger assembly for a gas turbine engine, wherein the heat exchanger assembly comprises "an annular manifold comprising an inlet manifold coupled in flow communication with a compressor and an outlet manifold coupled in flow communication with a combustor, said annular manifold substantially concentrically aligned with respect to an axis of rotation of the gas turbine engine, and said inlet manifold and said outlet manifold each including an outermost surface having a substantially equal radial distance with respect to the axis of rotation of the gas turbine engine . . . an annular heat exchanger coupled in flow communication to ~~a~~ the compressor via said annular manifold, said heat exchanger configured to channel compressor discharge air to said combustor, said heat exchanger assembly coupled to said gas turbine engine such that said heat exchanger is substantially concentrically aligned with respect to the axis of rotation of the gas turbine engine, said heat exchanger comprising a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from the gas turbine engine."

No combination of Zirin, Beam, and Dyste, describes nor suggests a gas turbine engine having a heat exchanger assembly as is recited in Claim 8. Specifically, no combination of Zirin, Beam, and Dyste describes nor suggests a heat exchanger assembly including a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine. Rather, in contrast to the present invention, Dyste describes a heat exchanger, wherein each heat exchanger element is aligned substantially *parallel* to a direction of exhaust flow discharged substantially axially from a gas turbine

engine, Zirin describes a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged *radially outward* from a gas turbine engine, and Beam merely describes air inlet pipes being coupled to an outer shell of an annular recuperator. Accordingly, for at least the reasons set forth above, Claim 8 is submitted to be patentable over Zirin in view of Beam or Dyste.

Claims 9-10, 15, and 16 depend from Claim 8. When the recitations of Claims 9-10, 15, and 16 are considered in combination with the recitations of Claim 8, Applicants submit that dependent Claims 9-10, 15, and 16 likewise are patentable over Zirin in view of Beam or Dyste.

Claim 17 recites a gas turbine engine comprising "a compressor . . . a combustor downstream from said compressor . . . a turbine coupled in flow communication with said combustor . . . a heat exchanger assembly comprising . . . an annular manifold comprising an inlet manifold coupled in flow communication with said compressor and an outlet manifold coupled in flow communication with said combustor, said annular manifold concentrically aligned with respect to an axis of rotation of the gas turbine engine, and said inlet manifold and said outlet manifold each including an outermost surface having a substantially equal radial distance with respect to the axis of rotation of the gas turbine engine . . . an annular heat exchanger comprising a plurality of heat exchanger elements, said heat exchanger coupled in flow communication to said compressor via said annular manifold, said heat exchanger configured to channel compressor discharge air to said combustor, said heat exchanger assembly coupled to said gas turbine engine such that said annular heat exchanger is substantially concentrically aligned with respect to the axis of rotation of the gas turbine engine, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from the gas turbine engine."

No combination of Zirin, Beam, and Dyste describes nor suggests a gas turbine engine having a heat exchanger assembly as is recited in Claim 17. Specifically, no combination of Zirin, Beam, and Dyste describes nor suggests a heat exchanger assembly including a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine. Rather, in contrast with the present invention, Dyste describes a heat exchanger, wherein each heat exchanger element is aligned substantially

parallel to a direction of exhaust flow discharged substantially axially from a gas turbine engine, Zirin describes a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged *radially outward* from a gas turbine engine, and Beam merely describes air inlet pipes being coupled to an outer shell of an annular recuperator. Accordingly, for at least the reasons set forth above, Claim 17 is submitted to be patentable over Zirin in view of Beam or Dyste.

Claim 18 depends from Claim 17. When the recitations of Claim 18 are considered in combination with the recitations of Claim 17, Applicants submit that dependent Claim 18 likewise is patentable over Zirin in view of Beam or Dyste.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 8-10 and 15-18 be withdrawn.

The rejection of Claims 8-10, and 15-18 under 35 U.S.C. § 103(a) as being unpatentable over Dyste in view of Colby (U.S. Patent 2,969,642) is respectfully traversed.

Dyste is described hereinabove.

Colby describes a radiator matrix design including stator vanes that are configured to straighten a flow of swirling air discharged from a compressor. Accordingly, the stator vanes provide a substantially axial flow of air as it passes through a radiator. Notably, Colby does not describe or suggest a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine.

Claim 8 recites a heat exchanger assembly for a gas turbine engine, wherein the heat exchanger assembly comprises "an annular manifold comprising an inlet manifold coupled in flow communication with a compressor and an outlet manifold coupled in flow communication with a combustor, said annular manifold substantially concentrically aligned with respect to an axis of rotation of the gas turbine engine, and said inlet manifold and said outlet manifold each including an outermost surface having a substantially equal radial distance with respect to the axis of rotation of the gas turbine engine . . . an annular heat exchanger coupled in flow communication to ~~a~~ the compressor via said annular manifold, said heat exchanger configured to channel compressor discharge air to said combustor, said heat exchanger assembly coupled to said gas turbine engine such that said heat exchanger is

substantially concentrically aligned with respect to the axis of rotation of the gas turbine engine, said heat exchanger comprising a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from the gas turbine engine."

Neither Dyste nor Colby describe nor suggest a gas turbine engine having a heat exchanger assembly as is recited in Claim 8. Specifically, neither Dyste nor Colby describe or suggest a heat exchanger assembly including a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine. Rather, in contrast with the present invention, Dyste describes a heat exchanger, wherein each heat exchanger element is aligned substantially *parallel* to a direction of exhaust flow discharged substantially axially from a gas turbine engine, and Colby merely describes a method of straightening swirling air in a radiator. Accordingly, for at least the reasons set forth above, Claim 8 is submitted to be patentable over Dyste in view of Colby.

Claims 9-10, 15, and 16 depend from Claim 8. When the recitations of Claims 9-10, 15, and 16 are considered in combination with the recitations of Claim 8, Applicants submit that dependent Claims 9-10, 15, and 16 likewise are patentable over Dyste in view of Colby.

Claim 17 recites a gas turbine engine comprising "a compressor . . . a combustor downstream from said compressor . . . a turbine coupled in flow communication with said combustor . . . a heat exchanger assembly comprising . . . an annular manifold comprising an inlet manifold coupled in flow communication with said compressor and an outlet manifold coupled in flow communication with said combustor, said annular manifold concentrically aligned with respect to an axis of rotation of the gas turbine engine, and said inlet manifold and said outlet manifold each including an outermost surface having a substantially equal radial distance with respect to the axis of rotation of the gas turbine engine . . . an annular heat exchanger comprising a plurality of heat exchanger elements, said heat exchanger coupled in flow communication to said compressor via said annular manifold, said heat exchanger configured to channel compressor discharge air to said combustor, said heat exchanger assembly coupled to said gas turbine engine such that said annular heat exchanger is substantially concentrically aligned with respect to the axis of rotation of the gas turbine

engine, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from the gas turbine engine."

Neither Dyste nor Colby describe or suggest a gas turbine engine having a heat exchanger assembly as is recited in Claim 17. Specifically, neither Dyste nor Colby describe or suggest a heat exchanger assembly including a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine. Rather, in contrast with the present invention, Dyste describes a heat exchanger, wherein each heat exchanger element is aligned substantially *parallel* to a direction of exhaust flow discharged substantially axially from a gas turbine engine, and Colby merely describes a method of straightening swirling air in a radiator. Accordingly, for at least the reasons set forth above, Claim 17 is submitted to be patentable over Dyste in view of Colby.

Claim 18 depends from Claim 17. When the recitations of Claim 18 are considered in combination with the recitations of Claim 17, Applicants submit that dependent Claim 18 likewise is patentable over Dyste in view of Colby.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 8-10 and 15-18 be withdrawn.

The rejection of Claims 8-10, 15-18 and 21 under 35 U.S.C. § 103(a) as being unpatentable over any of the applied art, and further in view of Cook (U.S. Patent 2,925,714) or Moskowitz et al. (U.S. Patent 3,735,588) (hereinafter referred to as "Moskowitz") is respectfully traversed.

Dyste, Zirin and Beam are described above.

Cook describes a diffuser-regenerator unit (10) including a cylindrical shell (12), vanes (14), a centrifugal compressor (16), a combustion chamber (28) and a turbine housing (38). During operation, the centrifugal compressor (16) compresses air that is channeled through passages (36), which constitute a vaned diffuser. After diffusion is completed at area (A), diffused air travels through vanes (14) of a heat exchanger, the combustion chamber (28) and an outlet aperture (60). Notably, Cook does not describe nor suggest a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine.

Moskowitz describes a turbine engine (11) including an air compressor (12), an annular forward heat exchanger (13) and a combustion chamber (14). Compressed air from the air compressor (12) is delivered through the annular heat exchanger (13) to the combustion chamber (14). The air may then be directed into a plenum (18) through an aft heat exchanger (19) and subsequently discharged through an exhaust section (21). Notably, Moskowitz does not describe nor suggest a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine.

Claim 8 recites a heat exchanger assembly for a gas turbine engine, wherein the heat exchanger assembly comprises "an annular manifold comprising an inlet manifold coupled in flow communication with a compressor and an outlet manifold coupled in flow communication with a combustor, said annular manifold substantially concentrically aligned with respect to an axis of rotation of the gas turbine engine, and said inlet manifold and said outlet manifold each including an outermost surface having a substantially equal radial distance with respect to the axis of rotation of the gas turbine engine . . . an annular heat exchanger coupled in flow communication to ~~a~~ the compressor via said annular manifold, said heat exchanger configured to channel compressor discharge air to said combustor, said heat exchanger assembly coupled to said gas turbine engine such that said heat exchanger is substantially concentrically aligned with respect to the axis of rotation of the gas turbine engine, said heat exchanger comprising a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from the gas turbine engine."

No combination of Dyste, Zirin, Beam, Cook, and Moskowitz describes nor suggests a gas turbine engine having a heat exchanger assembly as is recited in Claim 8. Specifically, no combination of Dyste, Zirin, Beam, Cook, and Moskowitz describes nor suggests a heat exchanger assembly including a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine.

Rather, in contrast with the present invention, Rather, in contrast with the present invention, Dyste describes a heat exchanger, wherein each heat exchanger element is aligned substantially *parallel* to a direction of exhaust flow discharged substantially axially from a

gas turbine engine, Zirin describes a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged *radially outward* from a gas turbine engine, and Beam merely describes air inlet pipes being coupled to an outer shell of an annular recuperator. Further, in contrast with the present invention, Cook describes an outlet aperture that is coupled to a diffuser-regenerator unit at a greater radial distance than an outermost surface of an air intake neck portion, and Moskowitz merely describes a single inner annular chamber for air flow through a compressor and a combustion chamber. Accordingly, for at least the reasons set forth above, Claim 8 is submitted to be patentable over Dyste, Zirin and Beam, and further in view of Cook or Moskowitz.

Claims 9-10, 15, 16 and 21 depend from Claim 8. When the recitations of Claims 9-10, 15, 16 and 21 are considered in combination with the recitations of Claim 8, Applicants submit that dependent Claims 9-10, 15, 16 and 21 likewise are patentable over Dyste, Zirin and Beam, and further in view Cook or Moskowitz.

Claim 17 recites a gas turbine engine comprising "a compressor . . . a combustor downstream from said compressor . . . a turbine coupled in flow communication with said combustor . . . a heat exchanger assembly comprising . . . an annular manifold comprising an inlet manifold coupled in flow communication with said compressor and an outlet manifold coupled in flow communication with said combustor, said annular manifold concentrically aligned with respect to an axis of rotation of the gas turbine engine, and said inlet manifold and said outlet manifold each including an outermost surface having a substantially equal radial distance with respect to the axis of rotation of the gas turbine engine . . . an annular heat exchanger comprising a plurality of heat exchanger elements, said heat exchanger coupled in flow communication to said compressor via said annular manifold, said heat exchanger configured to channel compressor discharge air to said combustor, said heat exchanger assembly coupled to said gas turbine engine such that said annular heat exchanger is substantially concentrically aligned with respect to the axis of rotation of the gas turbine engine, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from the gas turbine engine."

No combination of Dyste, Zirin, Beam, Cook, and Moskowitz describes nor suggests a gas turbine engine having a heat exchanger assembly as is recited in Claim 17. Specifically, no combination of Dyste, Zirin, Beam, Cook, and Moskowitz describes nor

suggests a heat exchanger assembly including a plurality of heat exchanger elements, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged substantially axially from a gas turbine engine.

Rather, in contrast with the present invention, Rather, in contrast with the present invention, Dyste describes a heat exchanger, wherein each heat exchanger element is aligned substantially *parallel* to a direction of exhaust flow discharged substantially axially from a gas turbine engine, Zirin describes a heat exchanger, wherein each heat exchanger element is aligned substantially perpendicular to a direction of exhaust flow discharged *radially outward* from a gas turbine engine, and Beam merely describes air inlet pipes being coupled to an outer shell of an annular recuperator. Further, in contrast with the present invention, Cook describes an outlet aperture that is coupled to a diffuser-regenerator unit at a greater radial distance than an outermost surface of an air intake neck portion, and Moskowitz merely describes a single inner annular chamber for air flow through a compressor and a combustion chamber. Accordingly, for at least the reasons set forth above, Claim 17 is submitted to be patentable over Dyste, Zirin and Beam, and further in view of Cook or Moskowitz.

Claim 18 depends from Claim 17. When the recitations of Claim 18 are considered in combination with the recitations of Claim 17, Applicants submit that dependent Claim 18 likewise is patentable over Dyste, Zirin and Beam, and further in view Cook or Moskowitz.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 8-10, 15-18 and 21 be withdrawn.

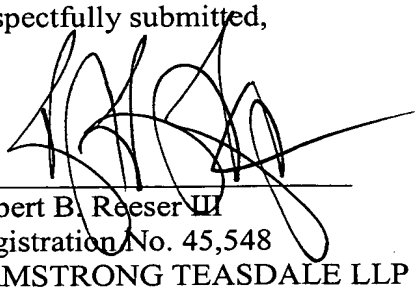
Newly added Claim 22 depends from Claim 8, which is submitted to be patentable over the cited prior art. When the recitations of Claim 22 are considered in combination with the recitations of Claim 8, Applicants submit that dependent Claim 22 likewise is patentable over the cited prior art.

Moreover, newly added Claim 22 recites a heat exchanger assembly in accordance with Claim 8 further comprising "a plug nozzle fixedly secured to a gas turbine rear frame, said heat exchanger elements extending radially outward from said plug nozzle." Applicants respectfully submit that none of the cited prior art describes or suggests a plug nozzle fixedly secured to a gas turbine rear frame, and heat exchanger elements that extend radially outward

from the plug nozzle, as is recited in Claim 22. Accordingly, for at least the reasons cited above, Applicants submit that dependent Claim 22 is patentable over the cited prior art.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully submitted,



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